

**NEW**  
recumbent-  
technology

**Spirit**  
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## Operating Manual and Service Instructions

January 2008

**2008**  
**HP** Velotechnik

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# Introduction

**Dear customer,**

thank you for buying a recumbent by HP VELOTECHNIK and congratulations on the purchase of your new Spirit! With the Spirit, a high-quality luxury bike, you will enjoy many years of exhilarating riding pleasure.

Your security and your satisfaction are our main concern. On the following pages, this manual will inform you about important safety issues as well as maintenance and care instructions.

Even if you have many years of experience with bicycles please do take your time to read this manual carefully. Your recumbent is designed with the latest bicycle technology by HP VELOTECHNIK that partly needs special treatment and care.

In this manual you will find detailed instructions on how to optimize your Spirit to meet your demands and riding style as well as your size and weight.

In addition to this, we have put together a collection of information on care and maintenance as well as special technical advice from our engineers.

This guide helps you to keep your Spirit in perfect condition so that you will always have maximum fun, comfort and safety.

Enjoy yourselves and have a great ride!

**Paul J.W. Hollants, Dipl.-Ing. Daniel Pulvermüller  
and the HP VELOTECHNIK team**

# Introduction

To this user manual also belong the original manuals of component manufacturers such as the brake manufacturer, the gear system manufacturer and the pedal manufacturer. These manuals tell you in detail how to operate and maintain those specific parts. Please do read the manuals of the part manufacturers as carefully as the manual on hand. Please have other users of your recumbent also read the manuals before using the bike.

The maintenance and adjustment of this recumbent partly require special tools and skills. Do only work within your limits and, in the interests of your own safety, do not go beyond. Should you be uncertain at any point, get in contact with your local dealer.

The instructions in this manual apply only to a completely assembled Spirit with standard parts from the series production of HP VELOTECHNIK.

On special demand HP VELOTECHNIK delivers frame kits with which a specialist dealer can assemble a bicycle individually. In this case the manuals on the operation and maintenance of the parts only represent a guideline, please do read every manual of every part manufacturer. The specialist dealer is responsible for the expert assembly, please contact him for detailed advice! A bicycle that has been assembled from a frame kit must always be tested and approved by a bicycle mechanic before your first ride.

**Caution!** The texts in the grey boxes are particularly important for your safety. Texts that begin with „**Danger!**“ mark an immediate danger for your life and your health. Please do read them carefully.



# General Safety Instructions

## Intended Use

Your Spirit is a bicycle for the use on streets and surfaced roads.

This bicycle is not designed for the use in racing and off-road riding, for jumping or acrobatics, and you must not ride across curbs, stairs, etc.

Damage through inappropriate use, assembly errors, accidents or similar activities and wilful damage results in the loss of any warranty.

The intended use also includes the precise observation of the prescribed usage and maintenance regulations and instructions.

## The First Miles

The first 300 km (186 miles) are an important phase in which you break in the bicycle.

During the first use of a new bicycle the screws may bed in and come loose. Cables and spokes may stretch. Bearings may show play. Please be very attentive during that period.

After 300 km or after two months at the latest you will have to take your bicycle to a bicycle mechanic for the first service. Please record this first service and the tasks performed in the warranty pass on page 57. The first service is the prerequisite for further use of the bicycle and for your warranty claims.

## Legal Requirements

When you ride your bike on the public road it must comply with national legislation and guidelines. These will vary from country to country. In general, there are minimum standards for brakes, reflectors and lighting systems, as well as usually a general duty to ensure that your vehicle is in roadworthy safe condition. There will also be a duty to ride in a safe and responsible manner. If you ride your HP VELOTECHNIK bike in traffic you should be sure to observe all the applicable laws and regulations.

In most countries, including Germany and the UK, two independent braking systems are required. Do not ride with only one brake working!

Please contact your local dealer to find out about your legal obligations.

As an addition, we recommend to mount a flag on a pole for better visibility in traffic.

The safety equipment on your bike must be checked before every ride and maintained in proper condition.

# General Safety Instructions

## Load Capacity

The maximum load (rider + luggage) is 130 kgs (286 lbs.). The maximum total weight (bicycle + rider + luggage) is 150 kgs (330 lbs.). The lower limit is valid. It is important to adjust the spring stiffness of the suspension according to the load, see the chapter about adjusting the suspension in this manual, 16.

With an attached trailer, the maximum total weight must not be higher than 150 kg (330 lbs)

## Carrying Luggage

Luggage transport is only allowed with the integrated seat rack, with a bicycle bag at the upper seat stay and with bags at the optional lowrider rack. You can put smaller items like a repair kit, your mobile phone or your wallet in the integrated bags at the lower end of the back rest.

Maximum load:

- rear rack 25 kgs (57 lbs.)
- bicycle bag at the back rest 15 kgs (34 lbs.)
- zipped bag in back rest 1 kgs (2.3 lbs)
- lowrider rack under the seat 25 kgs (57 lbs.)

Additional loading can influence the road performance of your bike considerably. If you plan on riding with heavy luggage we advise you to make a test ride on a street with no traffic to adjust to the new situation.

The load should be packed as close to the body of the rider as possible, since this leads to a more stable performance. You can also improve the handling of the bike by positioning the center of gravity of the luggage as low as possible, so pack heavy items in the bottom of your panniers.

Be careful that your luggage on the rack is safely stored. Bags must be tightly fastened to the rack or to the lowrider carrier that is available as accessory. In no case may loose parts like straps and belts touch the wheels, the derailleur or the suspension.

We recommend bicycle bags by ORTLIEB. You can buy them with extra large hooks matching the oversized tubes of the rack. You can also refit those large hooks later.

Take care that your luggage does not cover the lighting system and the reflectors of your bicycle and that they stay fully functional.

In case you want to park your bicycle take care to lean it on a wall or any other solid object. With the kickstand alone it is not possible to safely park a bicycle loaded with luggage, it could fall down and be damaged.

### Transport in the car

The best way of transporting your bicycle is inside the car. See that it does not lie on the derailleur.

If you want to transport it outside the car we recommend a roof-rack or a rear carrier. Take care to fasten your bicycle at the frame only.

**Caution!** Do not fasten your bicycle at the handlebar or, with disassembled wheels, at the dropouts. The wind causes violent forces that can stress the parts and therefore may cause damage. Such damage may not be noticed immediately.

Please remove any part that could come loose during transport (water bottles, luggage bags, pumps, pennants, etc.).

### Do not take kids with you

The Spirit is not designed for the transport of children. You are not allowed to mount a child's seat. It is only allowed to transport children in a trailer that has been specially designed for that purpose.

### Trailers

You are allowed to use trailers up to 40 kg (88 lbs.) with the Spirit. We recommend to assemble it with the Weber-coupling Type E. Always check that the suspension and the trailer still work properly after you have mounted the trailer. Take care that the trailer does not damage the frame in case the bicycle falls over.

### Added parts and accessories

Additional accessories may impair the function of your Spirit. We advise you to generally ask your dealer before you mount any special parts or accessories to your bicycle.

**Caution!** Mounting additional parts or accessories is at your own risk. It is important that you carefully read the installation guide of the manufacturer. Additions to the handlebar like fairings, handlebar fittings, bottle holders, etc. may impair your safety due to additional loading or clips with sharp edges.

Take care that the handlebar and the suspension always stay mobile. You may not add any parts to the handlebar or the seat that might endanger the rider through sharp edged or pointed shapes while steering, getting on and off the bike or bumping against something.

Before you purchase a bell or a lighting system make sure that these accessories conform to your national laws and regulations.

### Fairings

When you mount a fairing to your Spirit please take care to assure a good vision over the fairing and sufficient freedom of movement below.

Please take into account that any fairing makes the bicycle more prone to crosswind influences. In strong wind or gusts of wind unsafe situations may occur, please take off the fairing in such weather conditions before the ride.

# General Safety Instructions

## Replacement of Parts

The replacement of parts relevant for safety (especially brakes, lighting, handlebar, fork, drive train, suspension elements) should only be done with original parts by a bicycle mechanic, since it requires a certain degree of skill, suitable tools and mechanical aptitude.

Any technical change you perform on your own is at your own risk!

**Danger!** If any part is deformed (e.g. due to an accident or overload), especially frame, fork, handlebar, seat mounts, pedal, cranks and brakes, it is not allowed to use it any further or repair it. Do not try to straighten bent parts. You must replace them for your own safety. If you do not replace a damaged part it can result in a total failure of the part and you may be seriously injured!

## No alteration of parts

**Caution!** You are not allowed to perform any work on the parts of the bicycle, especially frame, fork, handlebar and seat, which might endanger their solidity.

These works include drilling holes, welding, brazing, painting methods that add heat or any other chemical treatment. If any of these works is done improperly it may result in a loss of strength through direct damage or increased susceptibility to corrosion.

## Final Assembly

Your bike has been delivered to your specialist dealer only partly assembled.

Your dealer has carefully finished the assembly, perhaps altered the specification of your bike to meet your special requirements and performed a test ride. Please take care that this pre-delivery service is recorded in the warranty document at the end of this manual.

All screws must be checked and tightened, especially at handlebar, stem, fork, swing arm pivot and wheels. Please follow the tightening settings in the table on page 55.

Rear derailleur and brakes must be checked and adjusted. Please follow the instructions in the manuals of the parts manufacturers that come with this manual.

## Screws and Bolts

**Caution!** Screws must be tightened with prescribed tightening torque. In this handbook tightening torques are given in Nm (Newtonmeter). Always use a torque wrench wherever a torque setting is given in this manual. Never rely on "feel". Screws tightened too much or not enough can break, which can lead to dangerous accidents. In case you don't own a torque wrench have your bicycle mechanic do the respective work. You will find a table with the prescribed torque settings on page 55 in this manual.

## Quick release levers

Quick release levers hold the seat of your Spirit in position.

The wheels come with screws and nuts at the axle as standard equipment. In case you have chosen wheels with quick release the following instructions are also valid for the wheels.

Please read the instructions of the quick release manufacturer.

**Danger!** An incompletely or improperly closed quick release can result in parts coming loose, and hence in a crash, possibly resulting in serious injury.

A quick release lever consists of two basic parts: the lever on one side provides the clamping force. With the adjusting nut on the other side you adjust the clamping tension on the screw thread.

To open the quick release move the lever away from the frame. In doing so the inscription "open" should be visible on the lever.

To close the quick release move the lever with power in the other direction so that the word "close" is visible on the outward side of the lever. At the start of the lever's motion, for, say, half of its movement, the lever should move very easily, without any clamping action. In the second half of the lever's movement the force on the lever should increase considerably, corresponding in the end to 15–20 kg (46 lbs.).

In its final position the lever should lie parallel with the bicycle and should not stick out to one side.



*The quick release levers must be closed firmly. Hold the seat frame with your fingers to enhance your thumb's power.*

Check the security of the lever by attempting to twist the lever. If the lever can be made to pivot around in a circle the clamping is too loose. You must re-open the quick release, hold the lever and increase the clamping tension. Do this by screwing the adjustment nut on the other side by half a turn. Close the lever and check the clamping anew.

Finally, check that the part being secured is firmly fixed: Lift each wheel several inch off the ground and give it a slap onto the tire from above. A properly fixed wheel will remain secure in the frame's dropouts.

The dropouts of the fork of your Spirit are designed as safety dropouts. Therefore you always have to loosen the clamping nut of the quick release when you take off the front wheel. When you reassemble it do not forget to tighten the nut again!

Parts that are fastened with a quick release open easily. Thus, they are more susceptible to theft. Therefore, always secure the wheels with a lock when you park your bicycle. It is also possible to exchange the quick releases with special security screws (e.g. from PITLOCK) that can only be opened with a special tool. For this please consult your local specialist dealer.

# Adjusting the seat

## Before the first ride: adjusting your new Spirit

The seating position is essential for your riding comfort, well-being and efficient cycling on the Spirit. Therefore adjust seat, handlebar and suspension to your individual requirements.

In order to adapt the Spirit as closely as possible to your body dimensions you can adjust the distance from seat to pedals, the seat angle, the angle and the position of the seat cushion individually.

The stem of the handlebar is vertically adjustable like a telescope. The handlebars are adjustable in their angle.

All adjustments together affect the distance between your knees and the handlebars as well as your minimum turning circle.

**Danger!** All procedures described here require a certain degree of skill, suitable tools and mechanical aptitude. After any assembly operation perform a static check and take a short test-ride on a quiet street, away from traffic. If you have any doubts please contact your local dealer.

Remove your luggage prior to all adjustments. That way you have easy access to all operating elements and you don't make the adjustment more difficult through additional weight.

## Adjusting the leg length: moving the seat

The Spirit is designed for people from 150–200 cm (5'–6'7") height. In order to adjust the distance between the pedals and the back of the seat move the seat on the rails.

Open the two quick release levers under the seat by turning away the silver levers from the frame.

Hold the frame with one hand. With the other hand you take hold of the seat unit at the integrated rear rack. Now move the seat to the correct position.

Close the two quick release levers by moving the levers towards the frame. The front lever in particular has to be closed tightly so that the angle of the back of the seat does not change during a ride.

In order to check the adjustments have another person hold the bicycle while you are sitting on the recumbent.

Adjust the front boom in such a way that your leg is fully extended when your heel (wearing flat shoes) is in the foremost position on the pedal. Experience shows that the pedal-to-seat distance on a recumbent can be slightly longer than on a conventional bike. While you are pedaling the ball of your foot should be positioned over the center of the pedal axle. It is important that your leg is not fully straightened when the crank is in the foremost position.

If the distance is too great it is difficult to overcome this dead point, pedaling becomes uncomfortable and there is too much strain on the sinews of your feet.

If the distance is too short you may suffer from knee pain or your legs bump on the handlebar.



Adjust the seat so that your knee will not be fully straightened when pedaling.

A wrong adjustment may lead to pain in your knees and inefficient pedaling. In addition we recommend to ride with a high pedaling cadence, which means to pedal fast and with little pressure. Pedalling with too much pressure may also lead to pain in the knees. You will find more information about this on page 26.

**Caution!** The two quick releases have to be closed firmly (tightening force 15–20 kgs / 45 lbs.) to safely hold the seat. You are not allowed to open them while riding. After they have been closed the imprint "close" must be visible. If the quick releases are not tightened appropriately the seat can move while riding and you may no more be able to handle your bicycle.

The area wherein you move the seat is limited to the front by a screw at the end of the rail. The screw head keeps the seat from gliding down off the rail and thus damages the surface of the frame tube. Always take care that this screw is placed in its drilling hole at the right front of the rail.

**Caution!** The seat rail does not have a limitation at the rear end. If you move the seat too far back the rear sliders glide off the rail so that you can't position the seat properly anymore. When you move the seat always take care not to move the seat too far to the back.

The seat rail has marks for easy length adjustment. The maximum rear position is clearly marked with a „max“ mark. Do not move the seat further back once the front edge of the front slider is aligned with the „max“ mark.

Since the rail is open at the rear end you can take off the seat for transportation.

To reconnect the seat onto the rail adjust the two sliders on the quick lever axle parallel to each other and to the rail and move the seat slowly onto the rail.

The easiest way to do it is when you park your bicycle with the kickstand. Kneel down behind the bicycle so that you have a good view on the rail and the sliders.

Take care that your fingers do not get caught between the rear rack and the frame and thus get hurt while you move the seat.

# Adjusting the seat

## Adjusting the seat angle

You can adjust the back rest in a range from 55° - 65°.

The angle you feel comfortable with depends on the form and the length of your back.

The back rest has an ergonomic shape according to the s-form of the spine. The upper bend automatically puts the neck in an upright position so that you don't feel any strain in neck and shoulders even on a long ride.

In addition to this you can influence the shape of the back rest by adjusting the tension of the inlaying belts.

For the beginning we recommend a medium seat angle. After you have gained some riding experience you can start trying different angles.

Recumbent beginners often start with a very upright seat position. That way the biggest part of your weight lies on the seat cushion and you mainly sit on your muscles which can lead to problems on a long ride.

The lower the angle the better you distribute your weight between seat cushion and back rest - this is one of the main advantages of the recumbent.

Another advantage of a low back angle is better aerodynamics. In a recumbent position you don't offer much surface for head wind which can result in a big plus in velocity.



Adjusting the back rest

To adjust the angle of the back rest only open the front quick release lever. That way the seat stays fixed on the rail and you keep the adjustment made for the leg length. Only when the back quick release lever is closed very tightly it is better to open it a little bit, too.

The rear rack moves together with the back rest. Take care to keep your fingers, bags, straps, etc. away from the area between integrated rear rack and frame while adjusting the back rest.

Hold the seat at the upper end of the back rest and move it to the correct angle.

Close the quick release levers.

**Caution!** The two quick releases have to be tightened firmly (tightening force 15–20 kgs. / 45 lbs.) after adjusting the seat. You are not allowed to open them while riding. After they have been closed the imprint "close" must be visible. If the quick releases are not tightened appropriately the seat can move while riding and you may no more be able to handle your bicycle.

## Adjusting the seat cushion

The angle of the seat cushion has an immediate effect on your riding comfort.

The steeper you adjust the cushion, i.e. the higher the position of the front part, the more contact the cushion has with your thighs. That way you distribute your weight onto a bigger surface. The feeling of being "in the seat instead of on the seat" is something which most people find very comfortable.

However, if the angle of the cushion is too steep it may pinch a little bit while pedaling. When you lower the front part a little bit it is also more comfortable for smaller riders to rest their feet on the ground during a stop.

In case the angle of the cushion is too flat you may have sometimes the impression that you glide off the seat to the front.

You will find the most comfortable seating position when you try different combinations of the angle of the cushion with its horizontal position, as described in the following.

To adjust the angle of the back rest only open the front quick release lever. That way the seat stays fix on the rail and you keep the adjustment made for the leg length. Only when the back quick release lever is closed very tightly is it better to open it a little bit, too.

Hold the seat at the upper end of the back rest with one hand. That way you keep the correct seat back angle.

With the other hand you hold the front part of the seat cushion and move it up or down to the correct angle.

Take care not to get caught in the moving parts with your fingers or your clothing.

Close the quick release levers.

**Caution!** The two quick releases have to be tightened firmly (tightening force 15–20 kgs. / 45 lbs.) after adjusting the seat. You are not allowed to open them while riding. After they have been closed the imprint "close" must be visible. If the quick releases are not tightened appropriately the seat can move while riding and you may no more be able to handle your bicycle.

The angle of both seat cushion and back rest is fixed by friction between quick release lever and seat fitting.

Always take care that the two grooved washers at the front quick release lever are located between quick release and seat fitting.



Schwenken des Sitzkissens

# Adjusting the seat

## Adjusting the horizontal seat cushion position

The seat is bolted to the fittings in long holes. That way you can adjust the horizontal seat position individually.

The more you move the cushion to the front the bigger the seating area, which distributes your weight evenly.

However, if the cushion is too far towards the front you may feel a gap between seat and back rest.

Also, the further the cushion is at the front the bigger is the feeling of being pinched at the front part of the cushion, also see page 11 for reference.

We recommend to start with a middle position and to change it only when necessary.

At the bottom of the seat there are four hex-headed screws. Undo the screws with an Allen key SW 4 by several turns.

Tighten the screws with 4-6 Nm.



*You can move the seat cushion back or forth after you have undone the four allen key screws.*

# Adjusting the handlebars

## Adjusting the height

The handlebars of the Spirit are held by a telescopic stem that is vertically adjustable.

The height of the handlebars determines the distance to your knees and the maximum possible cramping of the front wheel.

Before you adjust the height and the angle of the handlebars please make sure that the seat of your Spirit is well adjusted to your leg length, see page 8.

When you have little experience with recumbents, we recommend you to choose a high position for the handlebars, so that you have the biggest possible moving range for your legs.

After you have gained some riding experience you can lower the handlebars. The lower the handlebars the sooner your knees touch them while riding in a curve.

A low position of the handlebars permits a relaxed position for your arms and a good view to the front.

The handlebar stem consists of two parts. The upper part is connected with the handlebars and you slide it telescopically into the lower part.

The lower part has two clamping connections where the tube is slotted, and they are connected with a clamping screw. Those connections are in particular the connection to the upper part of the stem and the connection stem/fork at the lower end of the tube.

You adjust the height of the handlebars at the clamping at the upper end of the lower part of the stem.



*You can adjust the height of the handlebars by undoing the clamping screw.*

**Danger!** Every time you undo one of the clamping connections you have to check the clamping screw. You also have to check the welded-on thread nut. The thread must not be damaged and the screw must turn easily. Once a year you have to dismount the screw completely and check it. In case of damage or deformation you have to change the clamping screw immediately. When you refit the screw, it has to be lubricated carefully and tightened with the required tightening torque (see table on page 55).

In case you tighten the screws too much the clamping may deform and break. When you bend the screws while tightening they may break and the clamping can loosen. When you tighten the screws with an insufficient tightening torque, the clamping does not reach the necessary strength and this can result in a twisting of the handlebars or the stem while riding. All these assembly errors can lead to dangerous falls!

# Adjusting the handlebars

Loosen the hex-headed screw with an Allen key SW6 by several turns. Now you can slide the upper part of the stem up or down.

Secure the front wheel with your legs and turn the handlebars right-angled to the front wheel.

Tighten the clamping screw with 17-19 Nm. Check the safe clamping by trying to twist the handlebars against the front wheel.

**Danger!** Only pull the stem out so far as not to fall below the minimum insertion depth of 7 cm (2 3/4"). In no case may the lower end of the inserted tube be visible in the clamping slot or the mark on the upper stem half be visible above the lower half! When the stem sticks out too far the clamping may be damaged or the stem may come loose while riding, which can result in a dangerous fall.

**Caution!** After you have adjusted the handlebar position you also have to adjust the length of the brake cables and shifter cables. The cables have to run smoothly without any sharp turns and they may not be bent or stretched beyond their elastic limit when the handlebar is at maximum cramping. Also avoid large arches that could be caught up in other parts.

Take special care that the cable of the front disc brakes is not bent or stretched when you cramp the handlebars strongly.

You can make smaller adjustments by moving the cables in their guides at the frame and the handlebar, so that there is enough room at all mobile parts.

If this proves not to be sufficient you will have to have your specialist dealer shorten the cables or replace them by longer cables.

The cables are secured in their guides with plastic clips. Alternatively, you can fasten the cables with cable ties that you put through the cut in the guide.

## Adjusting the angle of the foldable stem

As an option, the Spirit can be equipped with the foldable Glideflex stem from Terracycle.

### **Angle adjustment of the folding stem**

The Glideflex unit is equipped with a backstop adjustment screw close to the pivot axle. To adjust the backstop, fold the stem forward and turn the backstop screw in or out with a 4 mm allen wrench. Turning the bolt in (clockwise) allows the handlebars to fold further back; turning the bolt out stops the handlebars from going as far back.

**Caution!** Do not turn the screw so far out that it contacts the top of the stem when it is folded back. The bolt must contact the sloping surface.

## **Adjusting the folding friction**

To adjust the folding friction, tighten or loosen the pivot bolt with a 5 mm allen wrench. Tightening the bolt will increase friction; loosening will decrease friction.

**Danger!** Do not loosen the bolt past the minimum friction point. If you do, retighten the bolt until you can feel the friction increase. The bolt must be secured with Loctite.

The friction adjustment should not need frequent readjustment in normal use. Sometimes, rain will cause the friction to drop slightly, but things should go back to normal when dried out.

### Adjusting the angle of the handlebars

By changing the angle of the handlebars you can adjust the position of the grips to the length of your upper body and arms.

Most riders are comfortable with a 45° angle, so that the grips are in a lower/inner position. The more you turn the grips down the less you can cramp the front wheel, since the handlebars touch your knees earlier.

In order to change the angle loosen the clamping screw of the handlebars at the upper part of the stem a little bit. Turn the handlebars into your favorite position. Check that the stem clamps the handlebars precisely in their middle.

Tighten the clamping screw with approx. 10-12 Nm. Check the correct clamping of the handlebars by pulling and turning them. In doing so, they must not move.

Please take care that the clamping area at the stem is free from burrs, so that it does not have any sharp edges. A sharp edge can cause the handlebars to break.



After you have undone the clamping screw you can adjust the handlebars.

While riding you should allow your arms to rest in a relaxed position on the handlebars. Do not pull on the handlebars. If the handlebars turn in the stem clamping during the ride, stop immediately and tighten the clamping screw of the handlebars again.

If the handlebars turn in a stem that is not sufficiently clamped, the handlebars or the stem might be damaged or deformed. In that case a secure clamping can no longer be guaranteed, even with the correct tightening torque, and handlebars and stem have to be exchanged.

### Handlebar grips

The grips on the handlebar are susceptible to wear and tear. Have your grips replaced by your bike shop once they don't feel comfortable anymore. The grips always need to be attached firmly to the handlebar.

**Danger!** Every time you undo the clamping connection you have to check the clamping screw. It must not show any sign of damage, deformation or corrosion. The thread must not be damaged and the screw must turn easily. In case of damage or deformation you have to replace the clamping screw immediately.

# Adjusting the suspension

## Purpose of the adjustment of the suspension

Your Spirit is fitted with a suspension fork for the front wheel and a rear swing arm for the suspension of the rear wheel. This system compensates slight bumps on the road so that riding is comfortable and the strain on your bicycle is reduced.

A well-adjusted suspension improves the traction of your bicycle on uneven roads. Especially when riding in a bend this allows a higher speed and also improves the safety.

In order to achieve maximum riding comfort, the suspension settings have to match your weight as well as the road condition.

The goals of the adjustment are:

- maximum use of the available suspension travel without the suspension frequently bottoming out
- quick reaction of the suspension without obvious oscillation after having passed a bump
- avoiding self enforcing oscillations, that means increasing oscillations of the suspension system due to pedaling influence, rhythmic body movements or permanent wavy underground

## Suspension and damping

The suspension systems of the suspension fork and the rear swing arm are fitted with the actual springs and dampers which are mounted separately. Often, the terms suspension and damping are used inappropriately in everyday language.

The **spring** is the elastic element that compresses and decompresses through the load which occurs on bumpy roads. While decompressing the spring releases the same energy it has saved during compression.

The Spirit is fitted with coil springs of steel at the suspension fork and the rear fork swinging arm.

The **damper** slows down the process of compression and decompression. That means that the bicycle after having passed a bump does not immediately "spring" back to the initial position or even further than that. The damper converts spring energy into friction and finally into heat, and thus takes away energy from the suspension system. That way the damper prevents that the spring swings uncontrolled after an initial stimulation. In addition, the damper helps to avoid self enforcing oscillations of the suspension that may be caused by reoccurring stimulations like pedaling forces within a crank revolution or the rhythmic up and down movement of the legs.

The suspension fork of the Spirit works with a mechanical friction damping. The rear suspension element has a hydraulic damping cartridge with a specific damping rate.

You can ride the Spirit with a considerably lower damping than for example a MTB: due to the relaxed and steady position of the body, the recumbent does not experience extreme variations in the load as it is known from the dancing on the pedals while riding uphill on a mountain bike.

In addition to this, varying pedaling forces have very little influence on the suspension of the bicycle due to the No Squat design of the suspension system of the Spirit.

It is necessary to choose the correct spring stiffness to have a well operating suspension system. The spring stiffness is a measure for the compression of a spring at a certain load. It is either given in "N/mm" (Newton per Millimeters) or "lbs/inch" (Pounds per Inch). Sometimes you only find "lbs." printed on the springs.

The suspension is designed in a way that the spring compresses considerably when you mount your bicycle. This is called negative suspension travel and it enables the bicycle to decompress on bumpy roads. You should choose a spring stiffness with which this negative suspension travel takes up around 20-30% of the overall suspension travel. This value usually provides a very comfortable ride on your fully suspended recumbent bike designed by HP VELOTECHNIK.

### Adjusting to load

The luggage carriers of the Spirit are mounted to the suspended part of the frame. That way your luggage is also fully suspended and it spares the material. Most notably, even under heavy load the suspension will compensate an uneven road much better and quicker compared to a design where the luggage carrier would be mounted to the unsuspended parts, e.g. the rear swing arm.

Additional luggage changes the load of the wheels and their suspension. The suspensions are more compressed through the load. That way, there is less suspension travel for bumps while riding. Your suspension could seize up more often.

The suspension of the front wheel is less affected since luggage at the rear rack almost only puts weight on the rear wheel.

The distribution of the load also differs with a change of the seat position. The more you move the seat to the back the more you have to increase the spring stiffness.

In order to compensate the variations in the load you can change the pre-load.

This can compensate for a load of approx. 10 kg (23 lbs.) at the rear wheel. In case of higher variations in the load you would have to exchange the spring for another spring with another spring stiffness.

# Adjusting the suspension

## Front wheel suspension with suspension fork

The front wheel is suspended by a suspension fork. The suspension fork of the Spirit comes with a steering head system. In contrast to conventional telescopic suspension forks the suspension is here in the steerer tube of the fork.

During compression the lower part of the fork moves into the steerer tube that is placed at the main frame. A dust boot protects the moving parts against soiling. Inside the steerer tube there is a torsion guide that secures the parts of the fork against turning, thus enabling precise steering movements.

Before you adjust the pre-load of the suspension fork or the spring stiffness, make sure that the torsion guides of the fork are in the correct position and the fork moves easily. See also the instructions in the chapter Maintenance and care on page 40.

A new suspension fork has to be broken in for at least 300 km (190 miles), so that the guides adjust and rough edges become smooth. At the beginning, the fork only compresses through hard shocks. Therefore, you should wait for the end of the break in phase to judge the pre-load and the spring stiffness correctly.

To get a feeling for the fork when it compresses, pull the front brakes with one hand. With the other hand, push the front end of the frame at the bottom bracket. Do not try to compress the fork by pushing the handlebars.

The suspension travel is about 30 mm (1,17 inch). The suspension fork should compress by 20-30% while mounting your bike (negative travel), this corresponds about 6-9 mm (0,2 - 0,4 inch).



*The suspension of the front wheel is integrated in the steerer tube.*

You will get this value by adjusting the pre-load, provided you have roughly chosen the correct spring stiffness (see page 19).

It is not important to exactly follow the recommended values for the negative travel, rather follow your feeling how the bicycle behaves during a ride, depending on the road situation and your speed. While riding you should only seldom feel the suspension bottoming out. However, in case this never occurs, the spring might be too hard, which means you don't use the total suspension travel.

## Adjusting the pre-load of the suspension fork

In order to adjust the pre-load you have to take off the handlebar stem. For that purpose, undo with an Allen key SW6 the lower clamping screw of the handlebar stem which clamps the slotted tube of the stem onto the steerer tube.



After you have undone the clamping screw of the stem you can take off the stem.

**Caution!** Do not undo the smaller clamping clip below the stem tube. This clip secures the headset and adjusts the steering play. If you have undone this screw you will possibly have to readjust the headset, see page 43.

Take off the handlebar stem and carefully put it aside. In doing so, take care not to bend or stretch the cables.

Now that the inner fork steerer tube is open you can see the adjustment screw. You can turn this screw with an Allen key SW6.

You increase the pre-load by turning the screw clockwise further in the tube.



*In the inner fork steerer tube there is the adjustment screw for the pre-load.*

You reduce the pre-load by loosening the screw anti-clockwise.

The spring must always have a low pre-load. The adjustment screw must at least be tightened by 12 turns in the steerer tube. Accordingly, there has to be a minimum distance of 7 mm (inch?) between the end of the steerer tube and the upper side of the adjustment screw.

When you suddenly feel a strong resistance while turning the screw into the tube, you have reached the maximum depth. In that case, undo the screw by one turn.

If the screw does not turn easily undo it entirely. Clean the threads, grease the screw lightly and turn it again into the tube as described above.

Remount the handlebar stem on the steerer tube. Secure the front wheel with your legs and adjust the handlebar right-angled to the front wheel. Check the safe clamping by trying to twist the handlebars against the front wheel.

# Adjusting the suspension

## Exchanging springs of the suspension fork

Your suspension fork comes by default with two standard (green) springs that cover a wide range of load and riding styles.

If the spring stiffness should not meet your requirements by adjusting the pre-load or if the suspension bottoms out too much, you can order one or two springs with another spring stiffness through your dealer and have them mounted there.

There are two spring stiffnesses for the Spirit suspension fork:

green = standard  
yellow = hard

The length is approx.  $46 \pm 2$  mm ( $1,8 \pm 0,1$  inch) per spring.

You can also mount a combination of different springs. If, for example, the standard middle springs are too hard for you, exchange at first only one middle spring for a soft spring.

Adjust the pre-load as described above and so find step by step the spring tuning of your fork that you are the most comfortable with.

In order to exchange the springs, remove the handlebar stem as described above under "Adjusting the pre-load of the suspension fork" on page 19.

Undo the adjustment screw completely with an Allen key SW6.

Push the front end of the frame down to push the fork completely together.

Below the adjustment screw there is a black spacer, the first spring, the spring busher and the second spring.

Remove these parts totally from the inner fork steerer tube. You can remove the springs that are deeper in the tube with the angled head of a spoke.



After you have undone the adjustment screw you can remove the springs.

Now exchange the springs. Lubricate the springs and the bushes. Remount the springs. Tighten the adjustment screw by at least 12 turns in the steerer tube.

Adjust the pre-load of the spring and mount the stem as described above under "Adjusting the pre-load of the suspension fork" on page 19.

## Adjusting the rear suspension element

For the rear suspension of the Spirit a steel spring is combined with a hydraulic damping unit in a spring element.

The damping results from fluid friction of an oil flow through thin holes of a throttle valve in between two chambers inside the damper. A slightly noticeable sound that may occur from this oil flow is normal.

Due to the fluid friction the spring element may heat up, therefore touch the spring element after a ride only when it has cooled off.

**Danger!** The suspension elements are filled with gas under high pressure. Never try to open the damper or to remove the screw at the gas tank. Inside the damper there are no user serviceable parts. In case of damage you will have to take the complete suspension element to your dealer.

**Danger!** While adjusting the rear suspension element never load the bicycle, e.g. through resting on the seat or loading the rear rack, when your hands or tools are close to the suspension element. Otherwise your hands may get caught and squeezed when the suspension compresses.

Your Spirit comes standard with a steel spring rear shock. As an Option, the air shock DT-Swiss XM-180 can be installed. Please read the manual of the rear shock manufacturer for details.



Rear suspension element of the Spirit

For the rear wheel the same guidelines as for the suspension fork are valid: for maximum riding comfort the suspension should compress by about 30% of the total suspension travel (100 mm) while you mount the bicycle in driving position. This corresponds to about 30 mm (1 1/5 inch).

For that purpose measure for example the distance between the end of the main frame and the rear wheel while the bike is unloaded as well as while sitting on the bicycle in riding position. Also take into account possible luggage.

You can affect this negative suspension travel depending on how much you weigh and how much you load your bike either by adjusting the suspension pre-load for fine tuning or by replacing the spring with a spring with a different stiffness in the rough tuning.

**Danger!** Take care that the rear wheel or the mudguard or the suspension element never hit the frame or the rear rack while the suspension is fully compressed.

Therefore, relax the spring completely by turning the spring retention disc on the thread of the spring element as far as it will go. Have a second person mount the bicycle and make the suspension bottom out by leaning on the seat or the rear rack.

# Adjusting the suspension

## Adjusting the pre-load of the rear suspension element (steel spring)

The pre-load determines how far the suspension compresses when you are sitting on the bicycle while standing still.

In order to adjust the suspension pre-load turn the knobby adjustment ring on the threaded part of the suspension element by hand.

Turning the adjustment ring clockwise (looking at it from behind) reduces the pre-load, turning it anti-clockwise, you screw the adjustment ring towards the spring and increase the suspension pre-load. It is helpful to turn the spring together with the adjustment ring.

The adjustment ring should be turned no more than five turns (measured from the relaxed position) towards the spring. If the suspension compresses still too far even after six turns, the spring is too soft and has to be replaced by a harder spring. A too big pre-load of a too soft spring does not take advantage of the full comfort potential. For instructions on changing the spring see page 45.



Turning the adjustment ring for the pre-load..

**Danger!** The adjustment ring has always to be screwed so far towards the spring that the spring has no play when unloaded. Otherwise the adjustment ring could come loose through shocks while riding, so that the slotted rear spring retention disc comes off. In that case the suspension element may be damaged or the rear wheel could hit the frame or rear rack, which may lead to serious falls.  
Always have an initial pre-load by at least half a turn on the spring.

## Air shock DT.Swiss XM-180

This rear shock contains pressurized air in a main („positive“) air chamber as suspension medium. Air shocks are lighter than steel spring rear shocks. Another advantage is that the spring stiffness can be easily adjusted with an air pump: By increasing the pressure the spring becomes harder.

The valve for the air chamber is located at the back end of the air shock. The valve is protected by a metal valve cap.

To pump up the air shock you need a special air pump designed for bicycle air shocks. It must have a fitting schrader valve adaptor and a pressure indicator.

When attaching or removing the pump to/from the valve, you will loose some air (about 0,5-1 bar). Take off the pump quickly.

### Recommended pressure settings

load	pressure
– 80 kg (183 lbs)	10,5 bar
–100 kg (230 lbs)	11,5 bar
–130 kg (286 lbs)	13,0 bar

Maximum allowed pressure is 18 bar.

**Danger!** Take care that the rear wheel or mudguard or suspension element never hit the frame, seat or rear rack box while the suspension is fully compressed.

Therefore fully deflate the air shock. Have a second person mount the bicycle and make the suspension bottom out by pushing on the seat or the rear rack.

### Adjusting the damping

By adjusting the damping you can adjust the performance of the suspension precisely to your individual riding situation. A rough street with many harsh bumps that occur in a row or even cobblestones needs a low damping rate while a road with long stretched bumps that occur more regularly needs a stronger damping to achieve a smooth road holding.

Please note that you can seriously spoil the riding comfort through a bad damper setting, especially through unsystematic playing with the knobs that may result in much to high damper values. In the worst case the suspension element will neither compress nor decompress. If you are in doubt please consult your local dealer.

A good setting for maximum comfort is achieved when the rear wheel decompresses completely after a shock and then oscillates only once. In order to check the adjustment you will need a second person that compresses the suspension by pushing the bicycle down while you are sitting on the bicycle in the riding position. The other person can then observe the suspension movements.

In order to adjust the damping during decompression, turn the adjustment knob on top of the rear end of the suspension element.

If you turn the knob in direction of the „-“ you will get less damping and thus faster decompression. Turning the knob in direction of the „+“ will give you more damping and thus slower decompression.

# Learning the new riding technique

## Learning the new riding technique

Your new bicycle has been assembled by your specialist dealer and adjusted together with you as described on the previous pages under "Adjusting your new bicycle". Before you mount your bike and take your first ride please make yourself familiar with the instructions on the riding technique and the handling.

To ride this recumbent you will have to make yourself acquainted with the different riding position. Make sure that you and all other future users of this bicycle will have read this manual carefully prior to the first ride. If you are in doubt please consult your local dealer.

Before the first ride, the users of this recumbent have to practice and make themselves familiar with the different handling. We recommend to practice riding your Spirit on a quiet road away from traffic. Before you ride the bicycle in traffic you must master the handling completely.

Go to a road where you can ride straight ahead without being hindered. Hold your bike at the handlebar and pull a break. Then mount your bicycle and lean back. Leave one foot on the ground and put one on the pedal. Therefore, rotate the crank in the top position so that you can later pedal with power.

Try to keep your balance in that position. Assure yourself that you can stop whenever you want to and hold the bicycle with one foot on the ground. When you feel safe put pressure on the pedal, loosen the brake, pedal with a lot of force and immediately put your second foot on the other pedal.

Do not care on which side of pedal you are currently pedaling in the beginning. Hold the handlebar loose but steady. Do not pull at it. Accelerate with a few pedal strokes. Your bicycle needs speed to stabilize.

Look ahead in the direction where you want to ride, not at the handlebar, at your feet or the front wheel.

In order to stop, brake carefully with both brakes until the bicycle has come to a complete stop. Only then do you put a foot on the ground and keep the balance.

**Danger!** Never touch the ground with your feet while the bicycle is still moving. The feet could be caught on the ground and be pulled backwards which could lead to a serious injury.

**Danger!** With a compact recumbent like the Spirit it is possible that a foot of the rider contacts the front wheel when riding sharp corners with a pedal in the front position. You will have to avoid this situation at all times since in extreme situations it may lead to a fall and injuries.

To control the bicycle you will therefore have to apply the following cornering technique: when you ride a curve stretch the leg on the outside of the curve, stop pedaling, only then start steering into the curve. Only when you ride straight ahead again may you resume pedaling.

# Protective clothing, cleatless pedals

**Danger!** Please note that you may be not be very late or not at all by other road users due to the low seat height and ride anticipatory according to this. This is especially important while riding in darkness. You yourself have a much better view than others perceive you. Ride defensively. We recommend you to mount a well visible and reflecting flag to the bicycle while using it in traffic. Please ask your dealer for more information.

## Use cleatless pedals

On request, your Spirit comes with pedals that have a binding system on one side.

As soon as you are comfortable with riding your Spirit you should use those cleatless pedals. Due to the rigid connection between shoe and pedal you don't have to keep your foot on the pedals with pressure anymore. This enables a more relaxed and round pedaling movement where you may even pull a little on the pedals. Without this connection to the pedals your feet may come off suddenly, which may result in a fall. Modern system pedals with binding therefore contribute to safe riding.

## Wear protective clothing

Riding a bicycle is a potentially dangerous sport where accidents can happen even when you take care of every safety instruction prescribed.

We recommend you to wear an approved bicycle helmet. Protect yourself by wearing special sports clothing that fits tight and is reflective.

When you fall with a recumbent you usually land on the side of your hips and your hands. Wearing reinforced cycling shorts and gloves reduces the danger of skin injuries considerably.

A first you will have to practice with these pedals to make sure that you can get off quickly in a dangerous situation. Please note the manual of the pedal manufacturer that comes with the binding system and have your dealer explain the use of the pedals to you. In the beginning set the release force of the binding on a low value to make sure you can get off safely.

Please use exclusively the enclosed shoe plates of the binding system manufacturer, do not use pedals from other manufacturers. If you use non-authorized shoe plates the binding system can not operate safely.

# Strain, Do not ride freehand

## Slowly increase the strain

We recommend you to perform only short rides without much power during the first weeks.

Always use a low gear and ride with a high pedaling frequency. Only after having acquired some training do increase the strain slowly.

When you ride on a recumbent you use other muscles than on a conventional bicycle, and they have to be trained first.

In case of an overload, the blood circulation in your legs may be affected, which shows in loss of power, a prickling in the toes, falling asleep of the legs or cramps. When you have a sporty way of riding, it can take up to 6 months until you have become accustomed to your recumbent.

Should you have pain in your knees while riding this is usually the result of too much power put into pedaling. The good support of the back sometimes misleads to putting the full power of the legs in the pedal, similar to the leg training machines in the fitness center. When you repeat it regularly it is harmful for the knees. Pain in the knees often results from an overuse of the muscles in the knee that can also be strengthened through exercise.

Also, a wrong adjustment to the leg length (in most cases too short) can lead to pain in the knees. You will find many tips on proper training for cyclists in miscellaneous books and magazines for cyclists.

Your pedaling cadence should stay between 80-100 revolutions per minute and not fall below 60 revolutions when going uphill. If necessary have your specialist dealer adjust the gear range to your riding style and the terrain you usually ride.

When you have the impression that riding your Spirit stresses your stomach muscles considerably, please lean consciously back and take care not to pull on the handlebars.

In case of persistent problems please consult your doctor.

## Do not ride freehand

**Danger!** In order to ride safely you have to keep both hands at the handlebar. Even when signaling keep at least one hand at the handlebar. Otherwise, unforeseen bumps in the road or oscillations of the steering may lead to a serious fall.

# Handlebars, Ride correctly and safely

## Do not pull at the handlebars

**Caution!** Do not pull at the handlebars with power. They have to be held in a relaxed position. The handlebars do not have the task to absorb the pedaling forces, this happens at the seat. Because of the long stem you exert a big leverage on the stem clamping of the fork when you pull at the handlebars, and you might damage the fork. A failure of the stem clamping can lead to serious falls.

Prior to each ride, check the stem clamping for any deformation or damage. In case of damage you must not use your bicycle any longer. Have your dealer exchange the damaged stem.

## How to ride correctly and safely

Always adjust your speed to the traffic, the road and the weather conditions. Ride slowly in curves and on unknown roads. Always ride at a safe distance from other road users, and when you ride in a group never ride side by side.

When you approach a traffic light never ride past the line of waiting cars, since even the most attentive car driver may not see you due to your low seating position.

**Caution!** Always carry your bicycle over stairs and curbstones. Do not ride through big road holes. Especially when road holes are filled with water it is very difficult to guess how deep they really are. In case you hit such an obstacle, frame and fork may be damaged which can result in a serious fall. At first, the damage may be unnoticed. Please check your bicycle immediately for deformations and cracks. If you are in doubt please consult your local dealer.

# Brakes

## Brakes

The Spirit is equipped with a powerful high-quality brake system. Please do read the separate manual from the brake manufacturer that comes with your bike for details.

Make yourself familiar with the braking system. Remember which lever pulls the front brake and which the rear brake.

If the arrangement of the levers does not correspond to what you are used to, please have a bicycle mechanic change it. Please contact your bike dealer to find out if there exists any legal requirement for the arrangement of the brake levers in your country.

For optimum handling you can adjust the distance between the brake grip and the handlebar with a small hex-headed screw at the grip, please see the respective manual for details.

Note that the rear brake is the most effective brake on the Spirit. With the rear brake, you achieve a much higher braking effect than with the front brake. The front wheel has a tendency to lock up and slip on the pavement even under low braking forces.

The braking effect of modern brake systems can be more powerful than what you have been used to until now. Do brake carefully.

**Danger!** Please note that the braking distance is much longer when it is wet or when the bike is heavily loaded. When riding on wet, sandy, icy or slippery roads you have to use the front brake very carefully to avoid that your front wheel slips. If it does so, you will no longer be able to handle your bike, which might lead to a serious fall.

Do not brake in a bend, always brake before a bend. Braking increases the risk of slipping.

**Danger!** In case you get into a situation like that during an emergency stop you have to let go of the brakes immediately, balance your bicycle and brake again. If you are not familiar with the brakes, we recommend you to train at first at low speed and with little braking effect until you find the correct dose for an emergency stop.

If you should hear any unusual sounds while braking or the braking effect is reduced, the braking pads might be worn. Do not use your bike any further until you have checked the braking pads according to the manual of the brake manufacturer or ask your local dealer.

**Danger!** Always make sure that the disc and brake pads are free of oil and grease. If these parts are dirty please do not use your bicycle any more. You can clean oily brake discs with alcohol or a special spray. Oily brake pads have to be replaced. If you are in doubt, please have your specialist dealer maintain your brake system.

**Caution!** Disc brakes can overheat on long downhill rides, fade and fail! Do not pull the brake levers constantly but brake powerfully from time to time. If you notice that the braking power starts to fade, do stop immediately and let your brakes cool off!

**Danger!** Never touch neither the brake disc nor the brake caliper after long braking as this may cause serious injury (risk of burns).

New brake systems, new brake pads and new brake discs need a break-in period to achieve maximum brake power. This period lasts for about 30-40 stops from about 30 km/h (20mph), which should be done in a safe area without traffic.

Check before every ride:

- that the brake system does not have any damages or leaks by activating the lever, holding it and checking the hose connections for possible leaks.
- that the brake lever pressure is ok by pulling the lever and ensuring that full braking performance is achieved before the lever touches the handlebar. If this is not the case, adjust the cable or change the brake pads, for hydraulic disc brakes pull the lever several times (pump) until it feels firm.
- check the hydraulic brake system for the correct pressure by pulling the lever, holding the pressure and checking the hose connections, bleeding screw and compensating tank for possible leaks.

# Gear System

## Gear System

With the gear system you can adjust the pedaling frequency, that means the number of revolutions of the crank per minute, to the terrain and the desired speed.

Your pedaling frequency should stay between 80-100 revolutions per minute and not fall below 60 while going uphill. If necessary consult your local dealer and have him retrofit the gear range to your style of riding.

Your Spirit comes with DualDrive gear system by SRAM that combines a 3-gear internal hub gear system with an 8-gear derailleur gear to 24 gears in total, which are easy to handle. As an option, you can order the Spirit with a 14-gear internal hub gear system made by ROHLOFF or only a derailleur gear system.. The following section refers to the DualDrive gear system only. Please refer to the manual of the gear manufacturer.

With the left-hand twist grip you operate the hub gear system. You can turn the grip in a standing position, and while riding during pedaling or without. The most comfortable and easiest way to shift gears is to shift while pedaling with reduced power.

According to the terrain choose between the uphill mode "1", standard mode "2" and racing mode "3". We recommend you to ride mostly in the standard mode since the transmission operates then with the least loss.

With the right-hand twist grip you operate the derailleur gear. You may only change the gears while you keep pedaling, smoothly and without applying great force, all the time that the chain is moving between the sprockets.

Choose between the easiest gear "1" and the heaviest gear "8".

Due to the long cables that expand under pressure and the housing that compresses under pressure, it may be helpful for changing gears quickly to turn the twist grip a little bit farther than necessary to select a gear and turn it back to the indexed position once the chain has properly shifted ("overshift").

Riding a recumbent requires foresighted gear shifting. Before stopping you should timely change in a low gear to make it easy to start off again, without having to pedal heavily struggling with your balance. Also while standing you can still operate the left-hand twist grip to the uphill mode "1".

**Danger!** Do practice shifting gears on a traffic-free street. In the course of this, make yourself familiar with the functioning of the twist grip shifters. Doing this in traffic could distract your attention from possible dangers.

In case your gear system does not operate smoothly anymore or causes noise while pedaling, please have your gear system adjusted once more according to the instructions on page 35.

# Light system

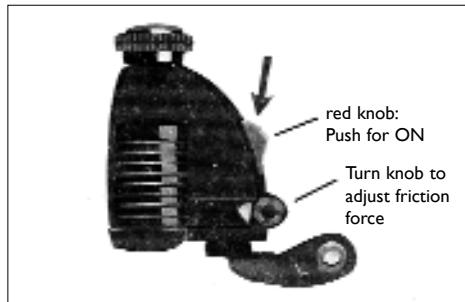
## Light system

If you want to ride your bike on public streets, it must be equipped with a legal light system. Do not only use your lights in the dark but also in the twilight of dusk and dawn. Due to laws and regulations the brightness of bicycle lights may be considerably lower than that of other vehicles. Therefore always keep in mind that other road-users may only see you very late or not at all.

For the Spirit, HP VELOTECHNIK offers two different dynamo light systems: one with a tire dynamo and the other with a hub generator.

Both light systems come with strong LEDs for headlamp and rear light. The LEDs last considerably longer (approx. 100.000 working hours) than a light bulb. For your safety the light system has a standlight system at the front and at the rear light, which makes the LEDs shine a few minutes after you have stopped riding. The electronic system is maintenance free. Because of the capacitors used you don't have to worry about batteries.

The cables and the contacts can be affected by corrosion or mechanical damage. Therefore, check the light system before every ride.



You switch on the tire dynamo by pressing the red button. To switch off the dynamo move it away from the wheel.

### Tire dynamo

You turn on the light system with the tire dynamo at the rear wheel by unlocking the swiveling dynamo. For this purpose, you press the red button at the dynamo until it moves towards the rear wheel. To turn the light off, you turn the dynamo by hand back to its initial position.

**Danger!** Do not try to operate the dynamo lever while riding, your hands could be caught in the wheel and be injured! To turn the light system on or off stop riding, dismount your bicycle and only then do turn the dynamo lever. Turn the lever carefully without applying force else you might bend the lever and damage the plastic parts of the dynamo.

**Danger!** The dynamo must always be safely fastened to the bracket at the frame, so that it can not turn. If the screws comes loose the dynamo can get caught in the spokes and block the rear wheel - danger of a serious fall! Always check the position and secure attachment of the dynamo before a ride.

# Light system, Prop stand

You can adjust the pressure of the dynamo against the wheel with the turning knob at the side. The pressure is right when the dynamo wheel just does not slip at the wheel, if the light flickers, the pressure is too low and you have to increase it. The position of the dynamo should be so that the extension of the dynamo axle points through the center of the wheel. Take care that the dynamo is mounted safely and does not turn. Worn dynamo wheels can be exchanged. Please ask your specialist dealer.

## Hub generator

The light system with a hub generator is switched on electrically. For this purpose you will find a switch on the back of the rear light with three labeled switch positions. With the switch you can turn the lighting system ON, OFF or set it on SENSOR. In the SENSOR position a twilight sensor in the lamp turns the lighting system on and off automatically, depending on the brightness of the environment.

The SON hub generator is highly efficient and works silently. When the dynamo is turned off



*You switch on the hub generator light system with the integrated switch at the front light.*

it has a very low turning resistance. Although you can feel the single poles of the used permanent magnets very distinctly when turning it by hand, the real rolling resistance is minute. (The loss is at 15 km/h under 1 Watt).

For details on the hub generator please visit [www.nabendynamo.de](http://www.nabendynamo.de).

## **Prop stand**

Only operate the prop stand when you stand beside your bicycle. In case you have a lowrider mounted to your bicycle, the prop stand would touch it under load.

**Danger!** Before every ride check whether the prop stand is lifted up to its riding position. With a recumbent prop stands are often forgotten. In the first left turn the prop stand can touch the ground and cause a fall! After a fall you will have to check the prop stand and the area where it is mounted for damage and deformation.

Before riding check that the propstand in any position does not affect the function of other parts.

The propstand is only suitable for parking the bike on even, solid ground. In case of unsuitable ground, luggage load or mounted fairings we recommed to lean the bike securely against a solid wall or pole.

# Maintenance and care, Brakes

## Maintenance and care

Your Spirit is fitted with the latest bicycle technology that does not require much maintenance.

However, you will have to maintain your bicycle regularly, as it is with other vehicles too. At least once a year the bicycle has to be taken to a bicycle mechanic for an overall service. Only this way a long lasting and safe function of all parts of your bicycle can be guaranteed. It maintains the value of your bicycle as well as the fun and the safety while riding for many years.

Read in this chapter how you can carry out smaller maintenance and care works between the services.

For a quick overview of the works to be done take a look at the warranty pass on page 58.

## Wearing parts

**Caution!** The maintenance works of this recumbent partly require special tools and skills. Do only work within your limits and, in the interests of your own safety, do not go beyond. Should you be uncertain at any point, get in contact with your local dealer.

Like every other vehicle the bicycle has parts that suffer from wear and tear. The life span of these parts depends on how often and how they are used, as well as how they are cared for. Please note that the wear and tear of certain parts of the bicycle is perfectly normal and not a reason for complaint. This manual contains information about the most frequent wearing parts.

## Brakes

The brake pads suffer from wear due to friction and have to be exchanged then. Depending on riding conditions, they can last between a few hundred up to several thousand kilometers. Please read the manual of the brake manufacturer carefully.

With rim brakes the rim walls suffer from wear. When the rims are too worn the tire pressure can tear up the rim and damage the wheel. Please have your bicycle mechanic check your rims at the latest after the second brake pad change and exchange them if necessary.

### cable operated (mechanical) brakes

The brake pads of your brakes are worn when you can pull the lever further and further to the handlebar before the pads touch the rim. Rim brakes: When the pads are so worn that you can't see the cross grooves of the pad anymore you will have your bicycle mechanic exchange the brake pads.

To balance the wear of the brake pads you can tighten the cable with the adjuster barrel where the cable goes into the brake lever. First loosen the locknut, then undo the screw so far that the wheel turns, barely not touching the pads, hold the screw and tighten the locknut again towards the brake lever. Take care that the slot of the adjuster points down so that no moisture enters from above or the front.

**Caution!** Damaged cables where single wires stick out have to be exchanged immediately. Otherwise your brake system may fail - danger! Please take care that the cable ends are always protected with a cap. Always keep the cables shortly trimmed. Leaving too much cable extending past the cable anchor can result in the cable catching in the rotor or wheel, which could then be pulled in the calliper, causing the wheel to lock up.

# Brakes

## mechanical disc brakes

If the brake pads are worn so far that tightening the cable tension is not sufficient, you can re-align the brake calliper in the slotted holes and adjust the inner brake pad with the hex bolt at the hub side of the brake calliper. Have this adjustment work done by a qualified bike mechanic.

Check your brake pads frequently as explained in the manual supplied by the brake manufacturer. Worn brake pads, oily or damaged pads must be exchanged immediately by a qualified bike mechanic.

## Hydraulic brakes

MAGURA hydraulic brakes use low viscosity mineral oil that, contrary to DOT brake liquid used in cars, does not absorb water. Thus, you don't have to change the oil. Please read the MAGURA manual that comes with the bike. You will find more detailed maintenance instructions in the manual "Workshop" that is available for download from MAGURA at [www.magura.com](http://www.magura.com). In case of a damaged hose or any leakage of oil always consult a qualified technician in a bike shop.

**Danger!** All maintenance work on the hydraulic system of your brakes may only be carried out by a qualified technician. In case these works are carried out without the required knowledge and skills the brake system might fail which can lead to a serious crash.

## hydraulic rim brakes

To balance the wear of the brake pads there is a turning knob at the brake lever. Turn this knob anti clockwise to move the pads closer to the rim. As soon as the knob doesn't turn anymore the brake pads have to be exchanged. Before you change the pads turn the knob clockwise as far as it will go, back to the initial position.

## hydraulic disc brakes

MAGURA disc brakes feature a fully automatic pad wear adjustment. Brake pads are subject to wear, therefore regularly check the thickness of your brake pads and replace them, if necessary. The minimum thickness of the brake pad incl. metal backing is 2.5 mm.

**Caution!** Never activate the lever blade without the brake pads in place and with the wheel dismounted. When you transport the bicycle without wheels always use the transport clips delivered with your bike or put a piece of cardboard in the brake calliper to replace the disc. Carefully separate brake pads that have moved together with a screwdriver.

# Gear system

## Gear system

Please read the manual of the gear system manufacturer carefully when you want to work on it.

Your dealer will have carefully adjusted your derailleur gearing system before handing over the bike. But during the first 300 kilometers (186 miles) of riding, the gear cables can stretch, making the gear indexing imprecise. The chain then climbs only hesitantly onto the next sprocket.

### Adjusting the gear indexing for the derailleur gear

Adjust the barrel adjuster where the gear cable goes into right twist grip or the derailleur. Do it in small steps of half a turn.

Check after each adjustment whether the chain moves smoothly up to the next larger sprocket. To do this, either turn the cranks by hand or ride the bike.

When the chain climbs up easily, you need to check that it still goes down easily onto the smallest sprocket. If necessary turn the barrel adjuster a little more and then try shifting gears again.

**Danger!** If the chain shifts over the smallest or the biggest sprocket you have to readjust the end-limit adjusters of the rear or the front derailleur. Incorrect adjustment can lead to the chain coming off, getting stuck or damaging the spokes, which may result in serious falls. The adjustment of the end-limit adjusters is a job for the professional cycle mechanic.

**Danger!** If the bike falls over, the derailleur or its mounting can be bent so that the movement of the derailleur changes. Check the movement and have it readjusted by your bicycle mechanic, if necessary.

### Adjusting the gear indexing for the DualDrive hub gear

Turn the left twist grip for the hub gear to the standard mode "2".

At the right side at the rear axle there is the click box for the hub gear. In the transparent window you see a yellow indicator. Adjust this indicator in line with the mark at the click box by turning the adjustment screw where the cable goes into the box.

All moving parts of the gear system are affected by wear. Cleaning and lubricating these parts frequently can prolong the life of these parts, however they will have to be replaced once worn out.

The cables have to be checked, cleaned and serviced regularly. Expect more wear and corrosion when the bike is often parked outside in bad weather conditions.

**Caution!** Damaged cables that show for example single wires have to be changed immediately. Otherwise they may damage your gear system. Take care that the ends of the cables are protected with fitting caps.

# Chain

## Chain

The chain is a wearing part that has to be lubricated regularly and to be changed at signs of excessive wear and tear.

### Lubricating the chain

Diligent lubrication is important. The chain of your Spirit is approximately 2.5 times longer than a standard bicycle chain (approx. 2.9 m, 119 inch). But it also lasts longer since a chain only wears while bending at the sprockets and the chain rings.

Use a good chain oil that won't leave a sticky film on the chain. The chain oil must not contain any aggressive chemical substances that might affect the surface of the chain tube.

Specialist stores sell biodegradable lubricants. HP VEOTECHNIK solely recommends ProfiDryLube. This lubricant is purely based on PTFE (Teflon) that keeps the chain clean and dry. This way dirt simply falls off and the tubes always stay clean. Your dealer can obtain it from HP VEOTECHNIK.

It is important that you clean the chain with an oily cloth before lubricating. Otherwise the fresh oil washes the dirt that clings to the chain into the gaps and the bushings where the dirt causes heavy wear.

Do not use any solvents to clean the chain! The solvent washes the oil off the bearing parts, stays there and dilutes the fresh oil so that a sufficient lubrication is not guaranteed. If you have treated the chain with a solvent you will have to heat it up with a hot air torch or boil it in chain grease.

An effective protection against corrosion is critical for a long chain life. Some minutes after you have oiled the chain rub it with a cloth to remove superfluous oil from the outer surface. Wax the chain thoroughly with a wax spray. The wax keeps off water, protects from corrosion and makes dirt fall off easily.

**Danger!** Take care not to pour any oil on the brake discs or the tires. The brake system could fail or the tires could slip away suddenly. The oil affects the rubber of your tires and could damage them. While lubricating cover the surrounding area with an old newspaper.

If the chain has become wet after riding in the rain you should put your bicycle in a dry and heated room, and every day you should turn the crank and so move the chain until it is dry again. Otherwise it is difficult for the moisture in the tubes to evaporate which may lead to corrosion at the chain.

### Changing the chain

The chain is one of the parts of the bike that will wear out. This shows in a stretching of the chain. Worn out chains do not fit the sprockets and the chain ring anymore and wear them away very quickly.

Check the chain regularly for lengthening. For this purpose try to remove the chain from the chain ring. The chain may come off to a maximum of 5 mm (0,2 inch). For a more precise reading you can buy a chain measurement gauge in your bike shop that you simply put into the chain.

Only use chains that are suitable for the gear system of your bike. Otherwise a precise gear shifting is not guaranteed any more. Please consult your dealer on this topic. He will also assist you in checking your sprockets and chain rings. A new chain does not fit a worn sprocket or chain ring. We recommend chains from SRAM (former SACHS/SEDIS) with rounded edges. They also shift gears very well.

The chain length has to be fitted so that the arm of the derailleur is not fully stretched when you shift onto the the big rear sprocket. The derailleur must be able to compensate a tightening of the chain by 4 cm. Please see also the manual of the derailleur manufacturer on the choice of the correct chain length.

**Caution!** The chain has to be closed with a special joining link or a chain riveting tool that expands the ends of the rivet while riveting (ROHLOFF revolver). A poorly joined chain may break, you can come off the pedals and fall. If you are in doubt please have adjustments of the chain length or the changing of the chain be done by your bicycle mechanic.

See that the joining link is not bigger in size than the other chain links to avoid irregular chain sounds. We recommend the joining links by SRAM (power links). Every time you change the chain you also have to mount a new power link.

**Caution!** When you change the chain take care that the new chain does not show any sharp edges or burrs. Very thin racing chains are also not suitable since they wear the chain tubes and the chain roller much faster.

HP VELOTECHNIK delivers spare chains by the meter via your dealer. For this purpose please indicate the exact length of your chain or order it a little bit longer if you want to be sure it fits. You will need approx. 1,9 m (119 inch) of chain.

# Chain tubes

## Chain tubes

The chain protection tubes are made of a long lasting plastic that features very low friction, slow wear and good noise damping. The tubes protect your clothes against the chain oil as well as the chain against dirt from the road.

The tubes are attached to the frame with a flexible belt an zip-ties.

The tubes are worn by the chain and have to be cut at the ends and expanded again (or exchanged) after 3.000-5.000 km (1600-2700 miles) approximately, depending on how many kilometers have been ridden, on the chain type and the overall riding condition. You can extend this maintenance interval by turning the tubes by a quarter turn from time to time so that they do not keep wearing out in the same place.

The intensity of the wear depends mainly on the chain type. Please see also the instructions on "Chain" on page 36.

In order to perform any work at the chain tube you'll have to open the chain and finally close it again. Please see the instructions on "Chain" on page 36.

**Caution!** Take care that the chain tubes keep at least a 5 cm (2 inch) distance to the rear and front derailleur when the chain is stretched to the maximum, and that the tubes are well fastened. If necessary you will have to shorten the tubes. If the end of a chain tube gets into the rotating drive train it can be blocked and the chain tubes may be destroyed.

## Expanding the tube ends

The ends of the tubes are expanded like a trumpet so that the chain can enter smoothly without friction and without making noises.

When the ends are worn out you can renew them through expansion. Remove the chain by opening the power link or open it with a special chain riveting tool. Cut the worn part of the tube exactly perpendicular with a sharp knife.

Heat the last 5-10 mm (0,2-0,4 inch) at the end of the tube with a gas burner or a candle and turn it permanently until the color of the utmost edge turns from a dull black to a shiny black. Now you expand the end with a proper tool, e.g. the grip of a screwdriver. Quench the expanded end immediately with cold water.

Take care that the tubes don't catch fire. At any rate, work in a place with sufficient ventilation.

If the tube is too short after you have cut it so that there is not enough protection anymore it has to be replaced. You can buy spare tubes either as uncut tubes or already cut into the correct length, complete with retention spring from your specialist dealer.

### **Changing single tubes**

Open the chain as described above and remove it entirely from the tube you want to change.

Use a side cutter or sharp knife to cut the cable tie that holds the tube in the belt. Remove the old tube from the belt loop.

Put the new tube through the belt loop. Put a cable tie through the ring in the belt and around the tube so that the lock of the cable tie lies hidden in the belt. Move the cable tie so that there are at least 5 cm to both the biggest rear sprocket and the chain blade cover at the front. Tighten the cable tie firmly and cut off the spare end.

Thread the chain again through the tube. Take care not to twist the chain. Close the chain again as described above.

# Suspension Fork

## Suspension Fork

Please clean the dust boot and the tube below every four weeks. Lubricate the free part of the slider tube after cleaning. Take care that the dust boot fits well. Otherwise, dirt and water can lead to corrosion.

Always check the correct position of brakes and wheels after you have worked on the suspension fork as described in the respective chapters.

The inner fork steerer tube is tightly fitted and glued in the fork crown, never try to tear this connection apart or to change the tube.

Never add threads to the steerer tube - danger of breaking! You can only use the fork with A-Head type headsets.

A new suspension fork needs a break-in phase of at least 300 km (160 miles) for the sliding surfaces to smoothen. At the beginning, the suspension compresses only under heavy shocks. In order to judge the response or the play properly you should first wait for the end of the break-in phase.

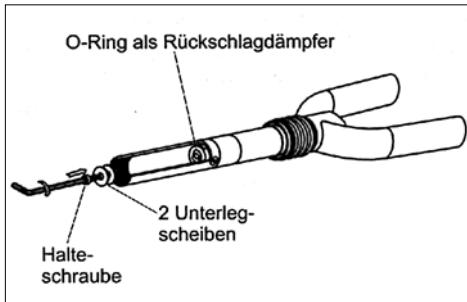
After 1000 km (550 miles), at the latest after a year, depending on what occurs first, you have to lubricate the suspension fork.

In case the fork shows play, it can be adjusted.

Please ask your local dealer for assistance.

## lubricating the suspension fork Federgabel

Dismount the stem, remove the adjustment screw and the springs as described under "Exchanging the spring of the suspension fork" on page 20. You don't have to dismount the headset.

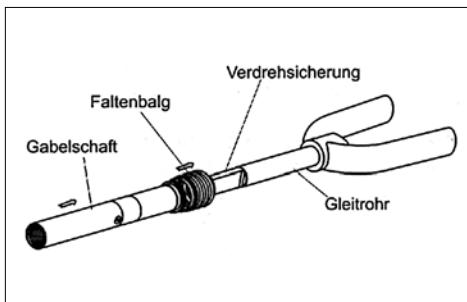


Undoing the screw in the steerer tube.

Compress the fork entirely.

Now undo the screw with a long Allen key SW4.

Pull the lower part of the fork out of the frame. Remove the screw with the two washers and the O-ring below upwards.



Remove the lower part of the fork downwards.

Clean the slide tube, the safety bolt against twisting and the inner part of the steerer tube with a soft cloth.

Lubricate the slide tube, the safety bolt against twisting and the inner part of the steerer tube with a good, acid-free grease. We recommend a lubricant with added solid particles like Teflon.

Carefully reinsert the lower part of the fork in the steerer tube. Take care not to cant the fork and to insert the safety bolt against twisting carefully in its guide.

Put the O-ring from above on the upper round part of the safety bolt. Then insert the screw with the two washers in the steerer tube and tighten it with 5.5 Nm.

Clean the springs, the spring bush and the spacer. Slightly grease the springs and the bushes.

Mount the adjustment screw with at least 12 turns. Adjust the pre-load and mount the stem as described under "Adjusting the pre-load of the suspension fork" on page 19.

### **Adjusting the steering play**

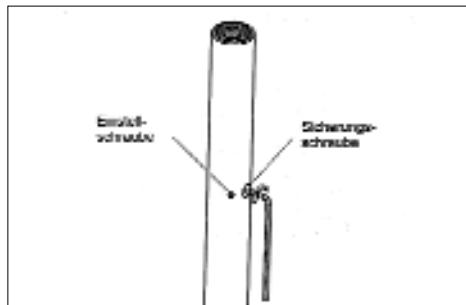
At the suspension fork of the Spirit the steering movement is transmitted via the safety bolt against twisting at the steerer tube to the lower part of the fork and so to the front wheel.

The transmission should happen without noticeable play, at the same time the fork should compress slightly under shocks.

You can check this steering play by holding the front wheel. If the handlebars move without resistance the play has to be reduced by adjusting the torsion guides.

In order to adjust the play you have to dismount the fork from the frame.

For that purpose, you have to dismount the stem. Remove the clamping clip above the headset and then remove the headset. That way, you can pull the entire fork together with the steerer tube out of the frame. Take care not to bend any cables.



*In the middle of the steerer tube there is a bigger safety screw and a smaller adjustment screw, facing each other.*

Undo the two safety screws and the adjustment screw by 1.5 turns.

# Suspension Fork

Press the fork together and try whether it compresses easily. If this is not the case, you have to clean the fork and lubricate as described on page 40.

Tighten both adjustment screws with 1 Nm. It is important that you tighten both screws evenly.

Tighten the two safety screws with 2 Nm. We recommend to fasten the screws in addition with LOCTITE.

Check whether the fork compresses easily. If not the adjustment screws have been fastened too tight or unevenly.

Wrap a cloth around the steerer tube and carefully clamp it in a workbench. Check the play by turning the lower part of the fork back and forth.

If the fork has still play adjust the screws again and tighten them evenly a little more.

If the fork shows no play you can remount it to the frame. Clean, lubricate and mount the headset. Put the clamping clip on the steerer tube above the headset. Adjust the headset as described on page 43.

Remount the stem to the steerer tube. Keep the front wheel with your legs in place and adjust the handlebars right-angled to the front wheel. Adjust the clamping screw with 18-20 Nm. Check the clamping by trying to twist the handlebars against the front wheel.

## Play in direction of travel

If you notice at your bicycle that the handlebar-fork-unity has play in the direction of travel, this may have several causes.

First please check if the headset is mounted correctly and adjusted without play. Please also see the instructions on page 43 for that.

When you pull the front brake and rock the bicycle a little bit back and forth while sitting on it you may notice a play in the disc brake system.

The brake pads have a small play in their guides that gives a jolt while rocking. In any case check whether the caliper is tightly and correctly screwed to the frame and whether the brake disk is tightly connected to the hub.

The suspension fork itself also has a slight normal play in the direction of travel that you'll notice while rocking back and forth with the front brake pulled. Similar to conventional telescopic forks this is immanent in the construction and does not cause problems while riding.

The bushing (as well as the springs) suffers from wear which depends on the frequency of use, dirt and lubrication.

If the bushing is so worn that the play makes the steering movements unprecise or produces unusual noise, the fork or maybe only the plain bushing has to be exchanged. Please contact your dealer for this service.

# Headset

## Headset

The front fork is pivoted in the frame through the steering head bearing, also called headset.

The headset can become loose through heavy shocks on the road.

### Adjusting the play

The steering head bearing has to be adjusted

**Caution!** Do not ride with a loose headset.

This increases the strain on the fork and the headset bearing. The headset may be damaged or the fork may break.



Adjusting the headset with mounted adjustment bushing.

Undo the screw of the clamping clip by one or two turns.

Carefully turn the end cap with an Allen key SW8 a little bit.

so that the fork turns easily with the front wheel without having play.

To check the bearing play pull the front brake and grasp with the other hand the upper steering head bearing. Then rock your bicycle hard back and forth. If the steering head bearing has play the upper housing distinctly shifts with respect to the lower.

To adjust the bearing you need the adjustment bushing and the end cap that have come with your bicycle. (With the optional folding stem, there are no adjustment bushing clamping clip.)

Put the adjustment bushing on the steerer fork tube over the clamping clip. Screw the end cap tightly into the steerer tube. For that purpose, the adjustment screw for the pre-load has to be turned into the steerer tube by at least 12 mm (5 inch).

**Caution!** Do not tighten the end cap very hard. It is only used to adjust the play. If the headset is adjusted too tight the surface of the bearings can be damaged. The consequence is a turning with jolts and rest positions. Then, the headset has to be exchanged.

In order to check whether everything works smoothly lift the bicycle at the frame so that the front wheel moves freely above the ground. Lean the frame a little sideways. Now the handlebar should immediately cramp smoothly. When you hold the frame steady and touch the handlebar lightly it should turn smoothly, without jolts, from its middle position.

If the bearing is adjusted too tightly undo the end cap a little bit. If necessary, you can loosen it with a light blow of a rubber hammer. Repeat the adjustment.

# Headset

After the headset has been adjusted without play tighten the screw of the clamping clip with 4-6 Nm.

Remove the end cap and take the adjustment bushing off the steerer tube. Safely deposit these two adjustment tools, best together with this manual.

Remount the stem to the steerer tube. Keep the front wheel with your legs in place and adjust the handlebars right-angled to the front wheel. Adjust the clamping screw with 18-20 Nm. Check the clamping by trying to twist the handlebars against the front wheel.

## **Lubricating the steering head bearing**

Once a year the steering head bearing has to be dismounted, cleaned and lubricated.

Take care of the exact order and position of the different parts of the bearing. After you have undone the clamping clip you have to readjust the headset as described above. If you are in doubt have your bicycle mechanic lubricate the steering head bearing.

## **Headset adjustement with folding stem**

With the optionally available folding stem, the stem is clamped directly to the fork's steerer tube; no clamping clip or adjustement bushing are installed. There is a cap above the folding stem in the end of the steerer tube.

After you have adjusted the bearing play as described above check if the stem is adjusted in a parallel position to the front wheel and tighten the two clamping screws alternately with 8-10 Nm. Check the clamping by trying to turn the stem against the front wheel.

**Danger!** The hex-headed screw in the cap adjusts the play of the steering head bearing. This screw does not help to clamp the stem tightly to the steerer tube. It does not secure it against turning. Take care that both clamping screws on the side are tightened as prescribed after you have finished your works at the stem. Otherwise the stem may turn while riding and cause an accident.

# Rear suspension element

## Changing the springs of the rear suspension element

You can buy the spring for the rear suspension element in different spring stiffnesses from your dealer.

We recommend the following spring stiffnesses, depending on the overall weight:

up to 80 kg (183 lbs): 650 lbs./inch

up to 100 kg (230 lbs): 850 lbs./inch

up to 130 kg (286 lbs): 1100 lbs./inch

Spring lengths:

DV22: 70–90 mm (2 3/4 – 3,5 inch)

(Length of the spring element: 150 mm)

In order to change the spring you will have to remove the upper screw and swing away the rear frame.

Hold the main frame of your bicycle in a work stand.

Push the safety ring at the thread of the suspension element to the front, so that you can undo the adjustment ring completely and then turn it to the utmost position at the front.

Remove the slotted spring retention disc at the rear end.

**Danger!** If the bicycle does not stand on the ground while undoing the screws of the suspension element, the rear swing arm may come down uncontrolled afterwards and hurt you seriously. In addition to this, the cables of the gear system and the brakes may overstretch or bend and you would have to replace them. Ensure that the rear swing arm comes down in a controlled and gentle fashion by putting up a solid string or cable tie between the main frame and the rear swing arm.

**Danger!** When the bicycle is standing on the ground, the frame and the swing arm come up against each other. Please make sure that this happens in a controlled and gentle fashion. Put a cloth between the contact points. Take care not to squash your fingers.

Undo the screws of the rear suspension element with two Allen keys and push the screw out of the suspension element eye.

Remove the spring from the suspension element and put in the exchange spring. Make sure that the new spring has the same diameter and length as the old spring and that it lies safely on the adjustment ring.

Put back the slotted upper spring retention disc on the piston rod. If necessary, compress the spring a little bit with a screw driver. The spring retention disc has to match its seating at the rear end of the suspension element.

Secure the spring by tightening the adjustment ring until the spring doesn't have any play anymore. Push the safety ring back into the slot on the thread.

Move the rear swing arm back up and connect the rear end of the suspension element with the rear swing arm with the bolt. Lubricate the bolt thoroughly. Secure the screws of the suspension element with LOCTITE and tighten the screw with 6–8 Nm.

Readjust the spring pre-load as described on page 19.

# Rear suspension element

## Cleaning the suspension element

Do clean the suspension element, especially the polished piston rod, if it is dirty. Remaining dirt can damage the seals of the hydraulic system and so shorten its life considerably. When you often use dirty roads you can protect the suspension element from dirt with an elastic cover that you can buy at your local dealer.

From time to time grease the thread for the spring pre-load with a drop of acid-free oil. Thus, you can always turn the adjustment ring easily by hand. Once a year you have to grease the pivots of the suspension element. For that purpose dismount the suspension element as described under on page 23.

Remove the plastic spacer and pull the metal tube off the bushing. Lubricate the bushing and the tubes with grease. Finally remount the suspension element.

Hydraulic dampers are effected by wear and tear through normal use. It depends on the usage of the bike, the amount of dirt on it and the maintenance and lubrication how long it lasts. After 3000 km the damper must receive an inspection by a trained mechanic, worn out parts or the hydraulic cartridge can be replaced then. Due to wear of the seals oil can leak from the damper or the internal oil can become foamy. This may lead to some noise when the damper is working. This noise does not effect the function of the damper. Only if there is no obvious damping after the first 5 mm of travel, the damper should be replaced.

Please also note the maintenance instructions of the damper manufacturer provided with your bike.



*The bushings of the rear spring element need to be lubricated once a year.*

# Swing arm pivot

## Swing arm pivot

The rear swing arm pivot comes with maintenance-free bushings. They have a self lubricating system with Teflon particles. The bushings sustain a very high load and they show almost no wear.

In case you notice play or a creaking noise at the rear swing arm please check the two screws that keep the axle in the frame. They will have to be secured with Loctite.

Tightening torques:

Mushroom head screw M8x25: 14-16 Nm

The bushings are exchangeable. For that purpose you will have to dismount the rear swing arm and send it together with the axle via your specialist dealer to HP VELOTECHNIK. After having been mounted the bushings are machined to adjust them.

## Undoing the axle screws

In order to mount the rear rack or the lowrider the axle screws have to be undone. We recommend you to leave one screw in place to prevent the axle from turning.

In case the rear swing arm is to be dismounted completely you can prevent the axle from turning by inserting a thin metal rod in the drilling of the axle through the drilling of the rear swing arm under the axle.

**Danger!** If the screws of the axle are not tight enough this leads to play and noises when the spring compresses. In extreme cases the swing arm may come loose which leads to a serious fall. If the screws are too tight the thread of the axle may tear out or the screw may be damaged.

**Caution!** There has to be a big washer between the main frame and the end of the bushing, else the busing is not able to function without play and the frame will be damaged.



*You can prevent the axle from turning by inserting a thin metal rod in the hole of the axle.*

# The seat

## The seat

The seat cover of the back rest stretches under load. On the back, there are four belts to tighten the back rest again. Try different tensions; often, a somewhat lower tension appears to be more comfortable.

Clean the back rest with lukewarm water and a sponge. Do not put it in the washing machine, since the net material with the reflective strip will be damaged.

The seat cushion suffers from wear and tear. It can be damaged by sharp items or by chemical cleansing agents. When the surface is worn or damaged you will have to exchange the cushion. Otherwise, dampness could get into the seat and affect the wooden underside, which would endanger its solidity.

If you dismount the quick releases of the seat fastening, take care to remount the black plastic bushings between the sliders when you put them back. These bushings work as compression springs that push the sliders away from the clamping rail after you have opened the quick releases. Only that way can the seat be smoothly moved on the rail.

At the front quick release there are on both sides knurled washers between the quick release and the aluminum fittings. These washers provide the clamping force necessary for the adjustment of the angle of the back rest. The knurling might affect the coating in the clamping area slightly but it does not interfere with the functionality.



*Clean the back rest and the zipper with lukewarm water.*

# Water bottle cage

## Water bottle cage

You can mount a water bottle cage at the main frame. For that purpose, there are threading inserts M5 at the top of the frame.

You can mount another water bottle cage at the stem, using the respective clips. Take care that the clips don't have sharp edges in order not to damage the surface of the stem.

Before buying a water bottle cage please try whether it fits your Spirit and accesses easily.

Another useful alternative to water bottles are systems with a "water bag" and a drinking hose, e.g. from Source or Camelbag. You can simply strap them behind the seat, onto the rear rack or to your pannier.

# Mudguards

## Mudguards

At bicycles with suspension, mudguards are exposed to very strong vibrations and may break through wear. Please check the stays of the mudguard regularly for their position and check the mudguards for cracks or deformations. Immediately replace damaged mudguards.

**Caution!** You must not mount additional parts like rear lights or reflectors to the mudguards since those may break then.

**Danger!** If branches or other obstacles get caught in the wheels while riding and are moved around they may drag the mudguards along. The mudguard can possibly fold up between frame and tire and hence block the wheel, which may lead to a serious fall. If you hear any unfamiliar noises while riding stop immediately and remove anything that might cling to the mudguards or the wheels.

In order to prevent falls you have to fasten the stays of the front mudguard with a security clip that opens under pressure. When the clip has opened once please replace it with a new one.

After you have performed service work or replaced mudguards check if the wheels turn freely. Between mudguard and wheel there has to be a distance of at least 7 mm (0,2 inch).

Check whether the wheels still fully compress with the mounted mudguards. The mudguards, stays and screws must not touch other parts under maximum compression.

# Wheels

## Wheels

The correct air pressure is decisive for smooth running and a good protection against punctures. The maximum pressure is printed on the side of your tire. Since your Spirit is fully suspended you can always go for the maximum pressure. You might find an indication of the minimum required pressure on the side of the tire as well.

Since the tubes in the tires gradually loose air you should check the air pressure before every ride.

The tubes come with Presta valves (also called french valves). They are very airtight and easy to pump up. For that purpose first undo the valve cap.

Now you see a small threaded rod with a knurled nut that comes out of the valve. Undo the knurled nut by loosening it as far as it goes.

To pump up the tire and check the pressure you need a pump with a gauge, preferably a solid standing air pump. Put the knob of the pump on the valve, push it completely on the valve and then retract it a little bit. Now you can pump up your tire easily.

After you have pumped up the tire to the maximum pressure pull off the pump knob. Secure the valve through turning the knurled nut on the threaded rod as far as it will go towards the valve. Finally put on the valve cap again.



*Before pumping up the tire, you have to undo the little knurled nut on the valve.*

**Danger!** Never pump up your tires beyond the maximum pressure. The tire may burst while riding or come off the rim, which may result in a serious fall.

**Danger!** Check your tires for damage on a regular basis. You should exchange tires with worn threads or damaged sidewalls.

Damaged rim tapes have to be exchanged immediately. Damages at the tires may lead to a sudden burst of the tire and thus result in a serious fall.

When you exchange tires please note the maximum width limit of 54 mm (approx. 2"). We recommend tires that are 40-54 mm (1,6 - 2 inch) wide. At the front wheel you have to use tires of ISO size 305 (16"), at the rear wheel ISO size 406 (20"). The tire width possible at your bicycle depends on the size of your rims. Please ask your local dealer.

# Wheels, Cleaning

After you have exchanged the tires please check if the wheels turn freely and check the minimum distance between mudguards and frame.

Due to the small wheel diameter even small tolerances in rim or tire diameter can cause visible misalignment of the tire on the rim. Pump up the tire to only 1 bar first, then align the tire by twisting it with your hands. Do not orientate yourself at the attached reflex strip, this strip can be slightly misaligned due to the production process.

To remove the rear wheel shift the rear derailleur to the fastest gear "8". Turn the twist grip of the hub gear to the uphill mode "1". Press the locking mechanism of the click box. Remove the click box. Now you can undo the axle nuts and dismount the rear wheel (see the DualDrive manual).

**Danger!** Take care that your spokes are always in perfect condition and the spoke tension is balanced. Do not ride with wheels that run untrue or wheels with loose or missing spokes. These faults may lead to a total failure of the wheel while braking and result in a serious fall!

**Caution!** To true up the wheels you need special skills, please have this work done by an experienced bicycle mechanic.

## Cleaning and conservation

The frame of the Spirit has a high quality and environmentally friendly powder coating. The surfaces of the aluminum parts are either polished or anodized.

To keep the surfaces brilliant over many years and to protect them effectively against corrosion the bicycle has to be cleaned from dirt and then conserved.

Dried sweat but also environmental influences such as air pollution, dirt on the roads and especially grit affect the parts, and not only may this cause flaws but also serious structural damage of the parts through corrosion.

In contrast to a widespread belief particularly the "non-rusting" aluminum is dramatically affected by grit! This kind of damage may not be visible in the beginning but it leads to a serious danger when the part breaks.

Do clean and conserve your bicycle diligently!

The best things to clean your bicycle with are warm water and a soft cloth. If your bicycle is very dirty first take a wet sponge to soften the dirt and then remove it. In case of bad grease or oil stains you should use a special cleansing agent for bicycles in addition.

**Caution!** Do not use any cleansing agents that scrub or are chemically aggressive since they affect the paintwork. Before using any cleansing agent please test it at a part of your bicycle that is not immediately visible.

**Caution!** Do not use any high-pressure cleaner. The strong jet of water goes through the seals of the bearings, blows away the lube and causes corrosion of the bearing parts and the chain. In addition to this it may damage stickers.

While cleaning your bicycle check it for any cracks, scratches, deformations, damaged parts, loose spokes etc. If you are in doubt please consult your local bike shop.

**Caution!** Schadhafte Lackstellen müssen umgehend von Rostansatz befreit und ausgebessert werden. Wird durch Lackschäden eine Stelle Ihres Rahmens freigelegt, kann die umgebende Lackschicht unterwandert und der Rahmen durch Korrosion zerstört werden.

In case of small scratches at the surface of the powder coating of the frame or the surface of the seat you can simply polish them away. You can buy a special polishing agent for epoxy resins at a specialist dealer for boat building. Do not use a polish for metal!

After you have cleaned the bicycle, dry it and treat the paintwork and the metal surfaces with wax. You can purchase this wax from your local bike dealer as a convenient spray.

The wax passes moisture and flows into tiny gaps and pores. After some minutes the solvent evaporates and leaves a dull and glutinous film. Now polish the waxed parts of your bicycle with a soft cloth to make it real shiny.

Do not only wax the frame but also the spokes, hubs, screws and nuts etc. You can also conserve the chain with a wax spray after lubricating it, see also the chapter on "Chain", page 36.

The frame has small holes for ventilation that prevent condensation in the frame. These drilling holes must not be sealed. However, moisture may enter the frame through the drilling holes. Therefore protect the inside of your frame by applying wax spray through the holes.

Protect the parts where cables or chain tubes may scratch the frame with a layer of tape. You can buy extra strong transparent tape at your do-it-yourself-store. That way you avoid scratches in the powder coating and coating coming off.

# Storing the bike, Screws and bolts

## Storing the bicycle

Before storing your bicycle over a longer period of time, e.g. over winter, please take care of the following steps:

- Clean your bicycle and protect it from corrosion as described in the chapter on "Cleaning".
- Store your bicycle in a dry and warm place.
- Avoid direct sun and storage close to the heating since it affects the rubber of your tires.
- Choose the uphill mode "I" at the hub gear and the smallest sprocket at the rear derailleur. That way the cables are in the most relaxed position.
- The tubes of your tires loose air when standing over a longer period of time. If the bicycle then rests on flat tires the tires may be damaged. Therefore hang up your bicycle or check the air pressure regularly.

The winter months are a convenient period of time for the annual service since then you won't have to wait long for an appointment. Many dealers offer special prices for the winter check.

## Screws and Bolts

Screws gradually settle in and through this they can come loose. Therefore check the screws and bolts regularly if they are tightened appropriately.

In the following table you will find the prescribed tightening torques, they refer to greased screws!

The grease also prevents your screws from seizing in their threads so that they won't unscrew anymore. In particular, screws made of stainless steel are susceptible to this and therefore have always to be put in with grease.

Do use high quality acid free grease, if possible a lubricant based on PTFE like Teflon or MoS<sub>2</sub>. Their ingredients still work properly after the thinner grease has been removed from the contact points. Alternatively you can use Loctite that you apply to the screw before you put it into the thread.

Always check the screws very diligently for signs of corrosion. Rust at the screw heads may also lead to the screw seizing in the thread. When the metallic and shiny coating of galvanized screws comes off and discloses dull, gray-brown steel you have to exchange the screw.

When you exchange screws please do only use screws of the same type. Screws come in different strength classes. Please do only use galvanized screws of the same type and strength, corresponding to the German strength classes 8.8 or stainless steel screws grade A2-70, when not given any other recommendation. If you are in doubt please ask your specialist dealer.

### Tightening torques for screws

The values indicated are meant for a friction value  $\mu=0,125$  (greased threads and screw heads). They only refer to the indicated parts. Please do always follow the values given in the manuals of the parts manufacturers, since the following values may not be the latest due to changes in the product line!

Part	connection	screw	tightening torque
brakes: mechanical			
- brake lever	handlebar/lever clamping	M6 SW5	4 Nm
- brake caliper	- caliper/frame	M6	8–9 Nm
	- cable clamping		8–9 Nm
- brake disc	- disc/hub	T20	4,5–6 Nm
brakes: hydraulic			
- brake lever	handlebar/lever clamping	M6 SW5	4 Nm
- brake caliper	- caliper/frame	M6 SW5	6 Nm
- brake disc	- disc/hub	M4 Torx T25	4 Nm
gear click box	cable clamping		4–5 Nm
dynamo	dynamo/frame	M6 SW5	6–8 Nm
suspension element	element/frame	M6	6–8 Nm
rear swing arm	axle	Linsenk. M8x25	14–16 Nm
b.b. set	cartridge/frame		50–60 Nm
crank	crank/axle	14'er Nuß	35 Nm
	chain ring screws		8–11 Nm
wheel	axle nut		30–40 Nm
lowrider rack	lowrider/main frame	M5 SW4	4–6 Nm
	axle	Linsenk. M8x25	14–16 Nm
hub	cassette/ lock ring		38–42 Nm
pedal	pedal/crank	SW15	35–40 Nm
shifter lever	lever/handlebar		2 Nm
derailleur	derailleur/frame	SW6	8–10 Nm
	cable clamping		4–6 Nm
mudguard	stay/frame	M5 SW4	4–6 Nm
seat	seat cushion/seat mounts	M5 SW4	4–6 Nm
	quick release		9–12 Nm
stem	fork/stem	M8 SW6	17–19 Nm
	telescopic stem	M8 SW6	17–19 Nm
	stem/handlebar	M7 SW5	10–12 Nm
pull rod DualDrive	pull rod/hube		0,3 Nm

# Warranty

## Warranty

Your dealer has to fully set up and adjust your Spirit, so that safe function is guaranteed. The dealer has to make a final safety check and carry out a test ride.

Your cycle dealer is obliged by law to ensure, among other things, that your bicycle is not affected by defects which materially diminish its value of suitability for the described purpose. The exact details will vary according to your country. In Germany, this liability ends two years after purchase.

In addition to this, HP VELOTECHNIK offers a 10 year warranty on the frame and the swing arm pivot of the Spirit against damage through original material or manufacturing defects. This warranty applies only to the original purchaser.

Damage through wear and tear, corrosion or damage at the surface coating is excluded.

Damage through inappropriate use, inadequate care and maintenance, falls, crashes, overloading through excess weight, incorrect assembly or modifications to the bike is also not covered. The onus rests with the purchaser. The warranty is void if any of the instructions in this manual are neglected.

The warranty starts with the date of purchase (receipt of the bike dealer) of a new bicycle. The warranty is processed via the bike dealer who ordered the bicycle from us.

We process our services preferably through your nearest HP VELOTECHNIK dealer but also through your local bike dealer.

In case of damage the specialist dealer has to send the damaged frame to us so that we can check it, if asked to do so by us. We do not take over any secondary costs.

In case of warranty we will cover the costs for the transportation within the usual limits (postal service). In case of warranty we will replace the damaged part with a part of our choice or a new part equal to the old one (warranty obligation).

In the event of any work that falls under warranty the usual warranty period will not be prolonged and no new warranty will be given. If HP VELOTECHNIK refuses to count a repair as warranty case we will only carry out a repair with costs after having talked to the customer or his representative, the respective dealer.

It is necessary for the purchaser to fill in the enclosed warranty registration form to benefit from the extended warranty. This filled in form has to be sent to HP VELOTECHNIK within 4 weeks after the purchase.

The warranty is only valid when the warranty pass at the end of this manual has been filled in when you received your bike, and when every inspection listed has been done and recorded by your bicycle mechanic within the described time schedule.

In the event of any warranty the warranty pass together with a copy of the proof of purchase has to be sent to HP VELOTECHNIK through your dealer.

This warranty does not have any influence on the rights of the purchaser according to his statutory rights.

# Warranty Pass

## Warranty Pass

With the HP VELOTECHNIK Warranty Pass you can assure the safety and proper function of your Spirit for many years.

Like any other vehicle your bicycle has to be checked for safe operation before riding. Your bicycle has to be maintained at regular intervals, at least once a year you will have to take your bicycle to a qualified bicycle mechanic for a thorough check.

The service plan on the next page shows you our mandatory maintenance and service works.

If you wish you can set an upper price limit for the service with your bicycle mechanic. If the necessary works exceed this limit you will be informed in advance.

Our tip:

You can avoid seasonal waiting periods in spring and summer when you have your annual inspection done in the quiet months from October to January. Many bike shops then have special winter check offers. At any rate do make an appointment. Clean your bicycle prior to the inspection since then many of the checks by sight can be done quickly and at low cost.

Please have your specialist dealer record every inspection work in the Warranty Pass. This is a requirement for the validity of our expanded warranty that exceeds the legal warranty.

# Warranty Pass

<b>Service Plan</b>	
<b>part</b>	<b>work</b>
light system	check functionality adjust headlamp and rear light, check cable contacts clean reflectors, replace missing reflectors
tires	check air pressure check tread and sidewalls
brakes	check for damages / brake test whilst standing still check cables / hydraulic system for leaking oil check rigid feel brake lever blades when pads reach rotor check brake pads for wear
suspension element	clean and oil thread lubricate bushes replace worn out parts / hydraulic cartridge
suspension fork	check dust boot and correct position lubricate check fork play, adjust if necessary
rear swing arm	check function and bearing play, tighten axle screws
bottom bracket bearings	check bearing play
rims	check alignment, check for cracks, dents, wear
chain	grease and check for wear
chain tube	check for wear expand ends or exchange tubes
crank	check, tighten
paintwork	conserve and repair
wheels	check alignment and spoke tension
handlebar	check for damage / bends
headset	check bearings, grease

see page	before every ride	monthly	annually	note
31	● ●		●	
51	●	●		
28 / 33	● ● ●			
45		●	● ▲	
40		● ●	▲	every 1000 km
47			▲	
			▲	
51			▲	
36		●		
38		●	●	
			▲	
52		●		
51		●		
13			▲	
44			▲	

# Warranty Pass

<b>Service plan (continued)</b>	
<b>parts</b>	<b>work</b>
hubs	check bearing play and brake discs mount
pedal	check bearing play, check binding mechanism
frame	check clamping of the front boom clean and conserve check for damage, damage to paintwork
quick release	check correct closing
derailleur	check for movement and function clean and lubricate
screws and nuts	check and tighten
mudguards	check for damage and correct position
valves	check for correct position and air tightness
stem	check clamping check clamping screws
cables	dismount, lubricate, replace if necessary

This service plan is intended to give you a rough overview over the required maintenance and service works. In no case it can replace the detailed instructions in this manual!

You can perform service works marked with a “●” when you have the required skills and tools as for example a torque wrench.

When you discover any defects while checking your bicycle they have to be repaired immediately. If you are in doubt please consult your local bike shop.

Works marked with a “▲” should only be carried out by a trained bicycle mechanic.

At the annual service the bicycle mechanic has to carry out all works listed as well as all services and maintenance works necessary according to the momentary technical standard and professional knowledge.

Please follow at any rate the manuals of the parts manufacturers.

see page	before every ride	monthly	annually	note
			▲	
			▲	
52		● ●		
7	●			
35	●		●	
54		●		
50		●		
51	●			
13	●			▲
35			▲	

The service intervals given in this Warranty Pass refer to an average use and a riding performance of 3.000 km per year.

When you ride more kilometers per year or often ride under bad conditions like rain, grit or other dirty factors it is necessary to have shorter maintenance intervals.

In order to measure your riding performance we recommend you to use a bicycle computer.

The regular service maintains the safe operation and the value of your bicycle. Not only does the completed Warranty Pass record the maintenance works for the validation of your warranty but also does it prove the care and the value of your bicycle - a good thing to have when you are going to sell your Spirit one day.

# Warranty Pass

## Your personal Warranty Pass

name:

adress:

telephone:

frame no:  
(close to the bottom bracket)

I have received the bicycle in good condition. adjusted to my size and performed a test ride.  
I have been informed about the correct use of the recumbent, the components like derailleur and especially steering and brakes as well as the necessity of regular service and maintenance. I will read the manuals prior to the first ride and have all future users read them too.

Date:

Customer's Signature:

Dealer's Signature an Stamp::

## service at delivery

*At the delivery of a new Spirit*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

(When you assemble a frame kit please list the components on an extra sheet and attach it to this Warranty Pass.)

**1st service**

*No later than 300 kilometers or 2 months after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

**2nd service**

*No later than 3000 kilometers or one year after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

# Warranty Pass

## 3rd service

*No later than 6000 kilometers or two years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

## 4th service

*No later than 9000 kilometers or three years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

**5th service**

*No later than 12000 kilometers or four years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

**6th service**

*No later than 15000 kilometers or five years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

# Warranty Pass

## 7th service

*No later than 18000 kilometers or six years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

## 8th service

*No later than 21000 kilometers or seven years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

**9th service**

*No later than 24000 kilometers or eight years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

**10th service**

*No later than 27000 kilometers or nine years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

# Warranty Pass

## 11th service

*No later than 30000 kilometers or ten years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

## 12th service

*No later than 33000 kilometers or eleven years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

**13th service**

*No later than 36000 kilometers or twelve years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

**14th service**

*No later than 39000 kilometers or thirteen years after the purchase.*

Order No.:

milage approx. km:

Date:

Dealer's Stamp and Signature:

Exchanged or additionally mounted parts:

Exchanged or additionally mounted parts:

**NEW**  
**recumbent-  
technology**



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